

East Tennessee State University Digital Commons @ East Tennessee State University

Undergraduate Honors Theses

Student Works

5-2018

INTERDISCIPLINARY KNOWLEDGE OF ETSU DENTAL HYGIENE AND NUTRITION STUDENTS

Jade Merritt

East Tennessee State University

Follow this and additional works at: <https://dc.etsu.edu/honors>



Part of the [Dental Hygiene Commons](#), and the [Dietetics and Clinical Nutrition Commons](#)

Recommended Citation

Merritt, Jade, "INTERDISCIPLINARY KNOWLEDGE OF ETSU DENTAL HYGIENE AND NUTRITION STUDENTS" (2018).
Undergraduate Honors Theses. Paper 453. <https://dc.etsu.edu/honors/453>

This Honors Thesis - Open Access is brought to you for free and open access by the Student Works at Digital Commons @ East Tennessee State University. It has been accepted for inclusion in Undergraduate Honors Theses by an authorized administrator of Digital Commons @ East Tennessee State University. For more information, please contact digilib@etsu.edu.

Interdisciplinary Knowledge of ETSU Dental Hygiene and Nutrition Students

By

Jade Merritt

An Undergraduate Thesis Submitted in Partial Fulfillment

of the Requirements for the

Midway Honors Scholars Program

Honors College

East Tennessee State University

Jade Merritt

Date

Dr. Tabitha Fair, Thesis Mentor

Date

Dr. Randy Byington, Reader

Date

Dr. Michelle Johnson, Reader

Date

Acknowledgements

First and foremost, I would like to thank my advisor, Dr. Tabitha Fair, for her continuous support, patience, encouragement, and expertise throughout this research process. Her guidance assisted me in completing this research and enhanced the writing of this thesis. I could not have chosen a better mentor for my study.

A special thanks to Dr. Randy Byington, a research methodologist for the Department of Allied Health Sciences, for his expert knowledge in statistical analysis, valuable feedback, and serving as a reader. Also, I want to thank, Dr. Michelle Johnson, a nutrition faculty member, for her time, valuable input, and serving as a reader.

Additionally, I want to thank some of the faculty members of the dental hygiene department, Dr. Deborah Dotson, Dr. Lesley Bailey, Mrs. Brittany Russell, and Mrs. Morgan Fletcher for their insightful comments.

Lastly, I am incredibly thankful for the honors college for motivating and pushing me outside my comfort zone and allowing me to gain experience in research. I am extremely grateful for all of the assistance and opportunities I have received throughout my time here.

There is a significant relationship between nutrition, systemic disease, and oral health (Decker & Mobley, 2013). The integration of both nutrition and oral health information into educational programs for dental hygiene and nutrition students is vital for each profession. Dental hygienists provide preventive and therapeutic services as well as educate patients regarding oral health, diet, and nutrition. Dietetic experts advocate for nutrition and oral health. As the knowledge of both disciplines increases and patients become more cognizant of their overall health it is essential for dental professionals and nutritionists to engage in dialogue with each other and with their patients. The purpose of this study was to determine the level of knowledge regarding the relationship between nutrition and oral health among ETSU senior dental hygiene students and senior nutrition students.

Background

The Role of Nutrition in Oral Health

The Academy of Nutrition and Dietetics, previously the American Dietetic Association, position paper argues that nutrition is a fundamental, key facet of overall oral health (ADA, 2007). Scientific evidence supports the interrelationship between nutrition and the integrity of the oral cavity in health and disease (ADA, 2007). Various chronic, systemic, and oral infectious diseases affect nutrition and oral health. Millions of individuals suffer from the two most prevalent and infectious oral diseases, dental caries or dental decay, and periodontal diseases (CDC, 2015). Over ninety percent of Americans have had a dental cavity at some point in their lives (CDC, 2014). The cause of dental caries is multifactorial and dependent upon the susceptibility of the host, cariogenic microorganisms, and frequent intake of carbohydrates (Filho & Giovani, 2009). Preventive measures can be taken to reduce the risk of dental decay, such as eating a healthy diet and practicing effective oral hygiene behaviors including fluoride

application (Decker & Mobley, 2013). Nutritional factors can also lead to dental erosion, the loss of hard dental tissue caused by acidic products (Moynihan & Petersen, 2004).

Dental plaque (biofilm) is composed of microorganisms; biofilm is the primary etiologic factor in periodontal disease, an inflammatory disease that can lead to the loss of periodontal ligaments and alveolar bone (NIH, 2014). Adequate nutrition is a relevant component of periodontal health and helps regulate periodontal inflammation (Najeeb, Zafar, Khurshid, Zohaib, & Almas, 2016, p. 2). Specifically, nutrient substances are linked to periodontal health and can be divided into two categories, micronutrients and macronutrients. Micronutrients include essential vitamins and minerals; macronutrients include proteins and carbohydrates. Malnutrition, or the deficiency of nutrients, can result in oral manifestations (p. 3). “Periodontal disease can be associated with changes in immunological and hematological markers modulated by dietary factors” (Decker & Mobley, 2013, p. 694). Both dental decay and periodontal disease can interfere with the integrity of the teeth and contribute to their loss, which in turn can have a detrimental effect or alter dietary habits.

Eating disorders, bulimia and anorexia can affect the oral cavity (Decker & Mobley, 2013). Oral manifestations occur from bulimia due to acid contents from the gastrointestinal tract, which primarily leads to tooth erosion; whereas, anorexia causes xerostomia and nutrient deficiency (Decker & Mobley, 2013).

Oral Health and Nutrition is Linked to Systemic Health

The interdependence between oral health, nutrition, and diet in systemic health is multifaceted, and adverse outcomes to overall health can develop when poor oral and nutritional habits exist. Several systemic diseases arise from a combination of dietary factors and periodontal diseases, such as cardiovascular disease (CVD) and diabetes (Dental Health

Foundation, 2016). Studies have recognized the strong correlation between periodontal disease and CVD (Demmer & Desvarieux, 2006). For example, pathogens that cause the inflammatory reaction and immune response of periodontal disease can enter into the bloodstream and instigate further complications, especially thickening of blood vessels, thereby impacting the cardiovascular system (Bartova et.al, 2014). Globally, CVDs are the leading causes of death; in 2012, over 17 million individuals died from them (WHO, 2016). CVDs are associated with behavioral and dietary risk factors. To control and reduce the incidence of CVDs, health care professionals must understand the multidimensional effects CVD has on overall health, and to use their knowledge to educate patients about these effects. The World Heart Federation (2016) asserts that a healthy diet is a vital component to reduce the risk of developing CVD.

More than 29 million Americans have been diagnosed with diabetes, which is the seventh leading cause of death in the United States (CDC, 2015). Diabetes Mellitus is a metabolic disease linked to various health complications. Diabetes and periodontal disease have a bidirectional relationship, and uncontrolled diabetes can significantly impact the oral cavity if left untreated (Kim & Amar, 2006). For example, “1 in 5 cases of total tooth loss is linked to diabetes” (Martin, 2016, para. 9). Diabetics are more susceptible to periodontal disease as a result of poor dietary habits and lack of regulating blood sugar levels; thus healthier diets, along with monitoring blood sugar, can aid in fighting off bacteria and decreasing the risk of oral infections, including periodontal disease (Martin, 2016). Periodontal disease can also complicate the management of diabetes. Research suggests that the bacteria that causes periodontal disease enters the bloodstream and the molecules released from the body’s immune response have the potential to harm the body, such as causing a spike in blood sugar levels or increasing insulin resistance (ADA, 2013). Therefore, it is critical for diabetic patients to make regular dental

appointments to treat periodontitis, which in turn, will lessen the severity of the disease (Martin, 2016).

Allied health care providers share the same interest: to promote optimal overall health. As research continues to demonstrate the correlations between nutritional factors and oral health, partnerships among dental experts, nutritionists, and registered dieticians are of interest, but only if baseline knowledge of each discipline exists.

Literature Review

Manifestations of various infectious and systemic diseases can be observed in the oral cavity (NIH, 2014). The prevalence of nutritional oral-related diseases, such as dental caries, are becoming more evident to health care experts (Ramos-Gomez, Crystal, Ng, Crall, & Featherstone, 2010). It is imperative that professional experts have at least fundamental knowledge of related health disciplines to provide appropriate examinations, interventions, assessments, and referrals for efficacy. Hence, effective training and education is crucial; the need to investigate providers' knowledge is a priority.

Research shows that dental professionals lack the understanding and skills needed to educate their patients about the importance of nutrition and its role in supporting oral health (Shah, Hunter, Fairchild, & Morgan, 2011). Likewise, studies have revealed that registered dieticians demonstrate insufficient understanding of oral health (Bhat, Lingaraj, & Aruna, 2014). In addition, Hein, Schonwetter, & Iacopino (2011) found limited knowledge among non-dental health experts, such as dieticians and other allied health professionals, regarding the interrelationship between oral health and overall health. Diniz, Costa, Oliveria, & Forte (2012) found that health professionals demonstrated a misunderstanding "of preventative practices in

children's dental care, which could be interfering in the health care provided to children" (p. 513).

Lastly, dental care providers and nutritionists must be competent and confident in their abilities to deliver comprehensive nutritional and oral care, as well as patient education. As new findings of the interrelationship between nutrition and oral health are reported, experts in these fields must be aware of and gather information about appropriate screenings, education, and referrals.

Purpose

The purpose of this study was to determine the knowledge levels of dental hygiene and nutrition students in regards to content material pertaining to each discipline. This study attempted to provide baseline data for those teaching in ETSU's Dental Hygiene and Nutrition programs to determine if modifications in the curricula are needed to better prepare future students.

This study analyzed and assessed the interdisciplinary knowledge of the senior dental hygiene and nutrition students in the class of 2018 at ETSU.

Research Questions

The following questions guided this project. What do dental hygiene students know about nutrition? What do nutrition students know about oral health? To what degree are ETSU senior dental hygiene and nutrition students knowledgeable about nutrition and oral health?

Methodology

This study design was a quantitative and descriptive knowledge based test. ETSU's senior dental hygiene and nutrition students were given the opportunity to participate by taking an identical online test to determine the degree of basic knowledge of each discipline. The senior

class of 2018 in the dental hygiene program at ETSU consists of 24 students; because I am part of the dental hygiene class of 2018 and have recused myself from the study and only 23 students had the opportunity to participate. The senior class of 2018 in the nutrition program is comprised of 13 students. The study's population was ETSU's 23 senior dental hygiene students and 13 senior nutrition students for a total of 36; there was no sample drawn from the population.

Before data collection, approval from the Institutional Review Board was obtained (see Appendix B). Prior to each group receiving the link to their test, an informed consent script was read aloud explaining the purpose of the research and that participation in the project was completely voluntary. There was no obligation to participate, nor were there any penalties for not participating, and names were not recorded or linked to any of the tests (see Appendix C). Completing and submitting the test served as the students' implied consent to participate.

On September 19, 2017 I administered the test to the dental hygiene students. Likewise, on September 21, 2017 the test was administered to the nutrition students. Since there were two different groups of students, the test was given in two separate classes, yet the procedure was exactly the same for both groups of students. However, all dental hygiene students received their appropriate link to the test at one time at the end of one of their classes in Lamb Hall, while all nutrition students received their link to the test at another time at the end of one of their classes in Hutcheson Hall.

The test contained a variety of appropriate questions related to their practice. I devised a 16-item online test; one question asked participants to identify themselves as either a dental hygiene or nutrition student and the other fifteen questions asked content questions (see Appendix A). Answer formats for these questions were all multiple choice, and the test was administered via Survey Monkey.

All participants were given as much time as they needed to complete and submit the test. Participants were asked to use their personal electronic devices to take the test; if any student did not have a device that they could use, one was provided for them.

Test scores were looked at as a whole between the two groups, and no test were tied to an individual student. I obtained all data responses and results from Survey Monkey. Following data collection, I gathered response data and transferred them onto a Microsoft Excel file and Dr. Randy Byington, a research methodologist for the Department of Allied Health Sciences, imported the excel file into SPSS software for data analysis.

The data was analyzed to compare and determine the interdisciplinary knowledge of senior students who are in the graduating class of 2018 in the dental hygiene and nutrition program at ETSU. Data was analyzed within the two discipline groups, and differences in responses and test scores based on student's majors were examined using an independent-samples *t* test.

Results

Thirty-four of the 36 potential participants (94.4%) from both the dental hygiene and nutrition program submitted a completed test. Excluding myself, all 23 members of the dental hygiene class of 2018 completed and submitted their test, while 11 of the 13 students from the nutrition class of 2018 completed and submitted their test.

An independent-samples *t*-test was conducted to determine if the responses differed between dental hygiene and nutrition students at ETSU. The findings of the independent-samples *t*-test revealed that at a 95% confidence level ($\alpha=0.05$), there were no statistically significant differences ($t(32)=0.089, p < 0.1$) in knowledge levels between the dental hygiene students ($N=23$) and the nutrition students ($N=11$). Levene's Test for Equality of variances showed no

violation of the assumption of equal variances ($p=0.750$). The analysis indicated a medium-size effect ($r=.3$), which accounted for 9% of the total variance. Table 1 exhibits group statistics between dental hygiene and nutrition students.

Table 1

Group	N	Mean \pm SD	<i>P</i> value
Dental Hygiene (DHYG)	23	71.87 \pm 9.18	.089
Nutrition	11	66.09 \pm 8.51	

Responses to each individual question were examined and the percentage of correct responses was computed. Table 2 lists every question with the exception of the first one (a demographic question rather than a knowledge-based question). This table compares percentages of correct responses for each question for both the dental hygiene and nutrition students.

Table 2

Test Question	Group	N	Percent of Correct Responses
Q2. Which of the following foods is the most cariogenic (promotes cavities)?	DHYG	23	13%
	Nutrition	11	45%
Q3. When recommending carbohydrates to a patient at risk for caries (cavities), simple	DHYG	23	35%

carbohydrates would be more beneficial than complex carbohydrates because of the following:	Nutrition	11	36%
Q4. Which factor is of <i>least</i> importance in contributing to caries?	DHYG	23	91%
	Nutrition	11	45%
Q5. Which pattern of carbohydrate consumption is the <i>most</i> detrimental to oral health?	DHYG	23	96%
	Nutrition	11	45%
Q6. Which dietary pattern often seen in pregnant women can detrimentally affect the oral cavity?	DHYG	23	57%
	Nutrition	11	55%
Q7. Which of the following can cause tooth erosion?	DHYG	23	100%
	Nutrition	11	100%
Q8. Which of the following statements is <i>false</i> regarding fluoride and its role in teeth?	DHYG	23	96%
	Nutrition	11	100%
Q9. Which of the following is <i>true</i> about alternative sweeteners and their relationship to caries?	DHYG	23	35%

	Nutrition	11	27%
Q10. Which of the following is <i>false</i> about dry mouth?	DHYG	23	35%
	Nutrition	11	18%
Q11. Vitamin A deficiency can cause dry mouth; individuals with dry mouth may have an increased risk of caries.	DHYG	23	70%
	Nutrition	11	55%
Q12. Nutritional factors can play a role in the development of periodontal (gum) disease. Periodontal disease has been associated with adverse pregnancy outcomes, heart disease, and diabetes.	DHYG	23	91%
	Nutrition	11	91%
Q13. Which of the following is <i>true</i> regarding diabetes and oral health?	DHYG	23	96%
	Nutrition	11	100%
Q14. Nutrition can exacerbate periodontal disease and over time can increase an individual's chance for heart disease. Which of the following reason explains the relationship between heart disease and oral health?	DHYG	23	57%
	Nutrition	11	91%
Q15. Consumption of fruits and vegetables may provide some	DHYG	23	83%

protection against cancers, including oral cancer. These protective factors are the same for individuals who smoke and consume alcohol and for those who do not.	Nutrition	11	45%
Q16. Oral health professionals should be prepared to do all of the following <i>except</i> ?	DHYG	23	96%
	Nutrition	11	100%

Question number 7 was the only question that 100% of dental hygiene and nutrition students answered correctly, which asked “Which of the following can cause tooth erosion?”. Although the mean test score for dental hygiene students at ETSU was higher, nutrition students as a group answered more questions 100% correctly than dental hygiene students. All eleven of the ETSU nutrition students answered questions 8, 13, and 16 correctly, which asked the following: “Which of the following statements is *false* regarding fluoride and its role in teeth?”, “Which of the following is *true* regarding diabetes and oral health?”, and “Oral health professionals should be prepared to do all of the following *except*?”. Ninety-six percent of dental hygiene students correctly answered all three of these questions.

When comparing each group, dental hygiene students scored above 50% on eleven questions while nutrition students scored above 50% on eight questions. Thus, there were four questions that the dental hygiene students scored below 50% and seven questions nutrition students scored below 50%. Combined dental hygiene and nutrition students scored below 50% on questions 2, 3, 9, and 10. Questions 2 and 3 refer to knowledge pertaining to foods that are cariogenic, and question 9 pertains to alternative sweeteners and their relationship to caries. Question 10 is a true/false statement about dry mouth. Similarly, dental hygiene students scored an average of 57% and nutrition students scored 55% on question 6, which asked “Which dietary

pattern often seen in pregnant women can detrimentally affect the oral cavity?” Though these scores are not below 50%, they are still lower than what is expected. Dental hygiene and nutrition students should be familiar with eating habits of pregnant women as it relates to oral health.

In addition to these questions, there were four questions on which nutrition students scored significantly lower than dental hygiene students. The questions or statements 4, 5, 11, and 15 are written as follows: “Which factor is of *least* importance in contributing to caries?”, “Which pattern of carbohydrate consumption is the *most* detrimental to oral health?”, “Vitamin A deficiency can cause dry mouth; individuals with dry mouth may have an increased risk of caries.”, and “Consumption of fruits and vegetables may provide some protection against cancers, including oral cancer. These protective factors are the same for individuals who smoke and consume alcohol and for those who do not.” In contrast to questions 4, 5, 11, and 15 nutrition students scored significantly higher than dental hygiene students on question 14, which asked “Nutrition can exacerbate periodontal disease and over time can increase an individual’s chance for heart disease. Which of the following reasons explains the relationship between heart disease and oral health?”.

Tables 3 and 4 are frequency distributions of individual test scores for the dental hygiene and nutrition students. No student scored below 50% or above 88%.

Table 3

Individual Test Scores of ETSU Senior Dental Hygiene Students (N=23, M=71.87, SD=9.18)	
Test Scores	Frequency
50%	1
56%	1

63%	3
69%	6
75%	7
81%	3
88%	2

Table 4

Individual Test Score of ETSU Senior Nutrition Students (N=11, M=66.09, SD=8.51)	
Test Scores	Frequency
50%	1
56%	1
63%	3
69%	4
75%	1
81%	1

Discussion

The study's purpose was to investigate the degree of knowledge of ETSU dental hygiene and nutrition students as it relates to their profession. All participants completed, and submitted the same test so that differences in participants' responses could be compared. Results indicated that there was not a significant difference between the knowledge levels of ETSU senior dental hygiene students and nutrition students. There was only one question that all respondents answered correctly which asked, "Which of the following can cause tooth erosion?" Dental

hygiene students are knowledgeable about the causes of dental erosion and are instructed to look for signs of erosion, and nutrition students are educated on the effects of acidic foods/beverages and vomiting as it relates to oral health. Three other questions were answered 100% correctly by all of the nutrition students, but only 96% of dental hygiene students. Those questions were “Which of the following statements is *false* regarding fluoride and its role in teeth,” “Which of the following is *true* regarding diabetes and oral health,” and “Oral health professionals should be prepared to do all of the following *except*?”. Although these questions were not answered 100% correctly, but rather were answered correctly by 96% of dental hygiene students, the results support the fact that both dental hygiene and nutrition students were educated on the effects of fluoride, how diabetes is related to oral health, and what the roles of their professions entail. Because all three of these questions included true/false statements, it is possible that the dental hygiene student(s) who missed these questions may have answered incorrectly not because they did not know the answer, but because they may have interpreted the questions or answers incorrectly.

Small differences in mean score occurred when differentiating between knowledge levels. Individually, all respondents scored between 50% and 88%. With a p value of .089, a statistically significant difference was not demonstrated between dental hygiene and nutrition students; however, the limited population size of this study could warrant more studies with a larger population.

Despite the absence of a statistically significant difference in responses between dental hygiene and nutrition students, evaluating the low scores from each group of students indicated that there is room for improvement. Students demonstrated strong knowledge in some areas and lack of knowledge in other areas in regards to the relationship of diet, nutrition and oral health.

Focusing on the areas where the students scored the weakest should be of interest for both programs.

ETSU's dental hygiene and nutrition programs are housed adjacent to each other. Additionally, program directors and faculty members from both disciplines work closely together within the college. ETSU's College of Clinical and Rehabilitative Health Sciences is in a position to explore the possibility of making changes within the curriculum in order to unite these two programs. Perhaps there is room to integrate better dental nutrition education. This could enhance the knowledge, understanding, and importance of the roles for both professions for students in the dental hygiene program, as well as students in the nutrition program, as it relates to the synergistic relationship between diet, nutrition, and oral health in regards to patient care.

Limitations and Implications

Although there was a high participation rate from ETSU's dental hygiene and nutrition programs, this study targeted a small population. The results of this study may not be used for further assumptions or generalizations of knowledge levels of students outside of ETSU's dental hygiene and nutrition programs. Regardless of the small population sizes, the intent of the study was merely to determine knowledge levels of ETSU dental hygiene and nutrition students on subject material pertaining to both disciplines. The goal of the study was to provide ETSU's dental hygiene and nutrition programs with useful findings that could be used as a foundation for future adjustments in the curricula, and subsequently improvement of diet, nutrition, and oral health education and readiness for the work field.

Furthermore, test questions may have introduced some bias favoring the dental hygiene students. As I am part of the senior dental hygiene class of 2018, the questions devised were

based on the extent of my knowledge as the primary investigator; however, all of the test questions were scrutinized by my thesis advisor, who has extensive knowledge in both discipline areas. The final set of test questions was not evaluated by a member of the nutrition department. However, my first draft of test questions was reviewed by a nutrition faculty member who provided valuable input and direction on how to formulate my final research instrument.

Future studies could involve larger population samples outside of ETSU's educational programs to increase reliability. Additionally, final test questions should be examined for appropriateness by faculty members from both the dental hygiene and nutrition department as to reduce any form of bias.

Conclusion

Dental care and nutrition are vital components to one's overall health. The importance of oral health must be acknowledged by nutritionists; equally, the impact of diet and nutrition must be recognized by dental providers. For this reason, collaboration between oral health and nutrition professionals is essential to provide the best service to clients. To accomplish the role of providing quality service, health care professionals, specifically, dental care workers and nutritionists, should have congruent basic knowledge of how nutrition and oral health are connected.

When comparing knowledge levels of dental hygiene and nutrition students, their responses from the test indicated that there was not a statistically significant difference. While there were a few questions that both dental hygiene and nutrition students answered either 96% or 100% correctly, respondents did not score as high on other parts of the test. Due to the lack of differences in responses as a whole, it can be inferred that ETSU's dental hygiene and nutrition students have been taught to some degree the same level of knowledge of content material

covering diet, nutrition and oral health. However, inferences can only be made based on data from this study within ETSU's institution. To make more appropriate assumptions on the knowledge levels of dental hygiene and nutrition students outside of ETSU's College of Clinical and Rehabilitative Health Sciences, further investigation is needed with a much larger population size for reliability purposes.

By testing senior dental hygiene and nutrition students at East Tennessee State University, data can establish whether or not students have baseline knowledge of interrelated discipline areas. From these results, there is potential to explore areas of change for both ETSU's dental hygiene and nutrition programs so that these programs can effectively prepare graduates for the workforce.

References

- American Dental Association (2013). Gum disease can raise your blood sugar. *Journal of the American Dental Association*, 144(7), 860. doi: [10.14219/jada.archive.2013.0199](https://doi.org/10.14219/jada.archive.2013.0199).
- American Dietetic Association (2007). Position of the American Dietetic Association: Oral health and nutrition. *Journal of the American Dietetic Association*, 107(8), 1418-1428. doi: 10.1016/j.jada.2007.06.003.
- American Dietetic Association (2003). Position of the American Dietetic Association: Oral health and nutrition. *Journal of the American Dietetic Association*, 103(5), 615-625. doi: 10.1053/jada.2003.50130.
- Bartova, J., Sommerova, P., Lyuya-Mi, Y., Mysak, J., Prochazkova, J., Duskova, J., Janatova, T., & Podzimek, S. (2014). Periodontitis as a risk factor of atherosclerosis. *Journal of Immunology Research*, 2014, 1-9. doi:10.1155/2014/636893
- Bhat, P., Lingaraj, S., & Aruna, C. (2014). Assessing the knowledge of dietitians regarding diet and oral health in Bengaluru city. *Journal of Indian Association of Public Health Dentistry*, 12(2), 119.
- Center for Disease Control and Prevention. (2015). *Basics about diabetes*. Retrieved from <http://www.cdc.gov/diabetes/basics/diabetes.html>.
- Centers for Disease Control and Prevention. (2014). *Oral and dental health*. Retrieved from <http://www.cdc.gov/nchs/fastats/dental.htm>.
- Center for Disease Control and Prevention. (2016). *Oral health conditions*. Retrieved from <https://www.cdc.gov/oralhealth/conditions/index.html>.

Center for Disease Control and Prevention. (2015). *Periodontal disease*. Retrieved from https://www.cdc.gov/oralhealth/periodontal_disease/index.htm.

de, O. D., Da Costa, C. H., Machado, Oliveira, A. F., Bezerra, Forte, F. D., & Soares. (2012). Health professionals' knowledge of oral health preventive practices regarding early childhood health care. *Journal of Public Health*, 20(5), 513-518.
doi:http://dx.doi.org.iris.etsu.edu:2048/10.1007/s10389-012-0492-0

Decker, R. T. (2004). Nutrition education of medical and dental students: Innovation through curriculum integration. *The Journal of Clinical Nutrition*, 79(2), 198-203.

Decker, R. T., & Lovern, C. V. (2003). Sugars and dental caries. *The American Journal of Clinical Nutrition*, 78(4), 881S-92S. Retrieved from ajcn.nutrition.org/content/78/4/881S.full.

Decker, R.T. & Mobley, C. (2013). Position of the academy of nutrition and dietetics: Oral health and nutrition. *Journal of the Academy of Nutrition and Dietetics*, 113(5), 693-701.
doi: 10.1016/j.jand.2013.03.001

Demmer, R.T., & Desvarieux, M. (2006). Periodontal infections and cardiovascular disease: The heart of the matter. *Journal of American Dental Association*, 137(1), 14S-20S.

Filho, J. C., & Giovani, E. M. (2009). Xerostomy, dental caries and periodontal disease in HIV+ patients. *The Brazilian Journal of Infectious Diseases*, 13(1), 13-17. doi: 10.1590/51413-86702009000100005.

Hein, C., Schonwetter, D. J., & Iacopino, A. M. (2011). Inclusion of oral systemic health in predoctoral/ undergraduate curricula of pharmacy, nursing, and medical schools around the world: A preliminary study. *Journal of Dental Education*, 75 (9), 1187-1199).

- Kim, J., & Amar, S. (2006). Periodontal disease and systemic conditions: A bidirectional relationship. *Odontology*, 94 (1), 10-21. doi: 10.1007/s10266-006-0060-6.
- Martin, L. (2016) Diabetes and your smile. *Mouth Healthy*. Retrieved from <http://www.mouthhealthy.org/en/az-topics/d/diabetes>.
- Moynihan, P., & Petersen, P. E. (2004). Diet, nutrition and the prevention of dental diseases. *Public Health Nutrition*, 7(1A), 201-226. doi: 10.1079/PHN2003589.
- Najeeb, S., Zafar, M. S., Khurshid, Z., Zohaib, S., & Almas, K. (2016). The role of nutrition in periodontal health: An update. *Nutrients*, 8(9), 530. doi: <https://dx.doi.org/10.3390%2Fnu8090530>.
- National Institute of Dental and Craniofacial Research. (2014). *Chapter 3: Diseases and Disorders*. Retrieved from <https://www.nidcr.nih.gov/DataStatistics/SurgeonGeneral/sgr/chap3.htm#top>.
- Ramos-Gomez, F. J., Crystal, Y. O., Ng, M. W., Crall, J. J., & Featherstone, J. D. (2010). Pediatric dental care: Prevention and management protocols based on caries risk assessment. *Journal of California Dental Association* 38(10), 746-761.
- Shah, K., Hunter, M. L., Fairchild, R. M., & Morgan, M. Z. (2011). A comparison of the nutritional knowledge of dental, dietetic and nutrition students. *British Dental Journal* 210(1), 33-38. doi: 10.1038/sj.bdj.2010.1184.
- World Health Organization (2016). *Cardiovascular diseases*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs317/en/>.

World Heart Federation (2016). *Cardiovascular disease risk factors: Diet*. Retrieved from <http://www.world-heart-federation.org/cardiovascular-health/cardiovascular-disease-risk-factors/diet/>.

Appendix A

Dental Hygiene and Nutrition Test

1. I am currently a:
 - a. dental hygiene student
 - b. nutrition student
2. Which of the following foods is the *most* cariogenic (promotes cavities)?
 - a. Sugar-free pudding
 - b. Jellybeans
 - c. Cooked vegetables
 - d. Hard candies
3. When recommending carbohydrates to a patient at risk for caries (cavities), simple carbohydrates would be more beneficial than complex carbohydrates because of the following:
 - a. Simple carbohydrates cannot be fermented
 - b. Simple carbohydrates are quickly digested
 - c. Simple carbohydrates contain more nutrients
 - d. None of the above
 - e. All of the above
4. Which factor is of *least* importance in contributing to caries?
 - a. Frequency of food intake
 - b. Quantity of food consumed
 - c. Retention and clearance time of food from the oral cavity
 - d. Consistency/texture of food
5. Which pattern of carbohydrate consumption is the *most* detrimental to oral health?
 - a. Eating large amounts of carbohydrates in one meal setting
 - b. Eating small amounts throughout the day
 - c. Avoiding carbohydrates
 - d. Carbohydrate consumption followed by drinking water
6. Which dietary pattern often seen in pregnant women can detrimentally affect the oral cavity?
 - a. Increased consumption of carbohydrate rich/ cariogenic foods to combat morning sickness
 - b. Increase in protein consumption
 - c. Infrequent snacking due to loss of appetite
 - d. Both a & c

7. Which of the following can cause tooth erosion?
 - a. Acid from vomiting
 - b. Sugar containing carbonated beverages
 - c. Gastro-esophageal reflux
 - d. Sugar free carbonated beverages
 - e. All of the above
8. Which of the following statements is *false* regarding fluoride and its role in teeth?
 - a. Fluoride strengthens enamel
 - b. Fluoride makes teeth more resistant to decay
 - c. Fluoride in water supports oral health
 - d. Fluoride can damage your teeth after eruption
9. Which of the following is *true* about alternative sweeteners and their relationship to caries?
 - a. Sugar alcohols do not contribute to dental caries
 - b. Sugar alcohols are a major contributing factor to dental caries
 - c. Xylitol can produce acids that demineralize enamel
 - d. Both b & c
10. Which of the following is *false* about dry mouth?
 - a. Can be caused by vitamin B deficiency
 - b. It is a side effect of medications
 - c. Can control the level of bacteria in the mouth
 - d. None of the above
11. Vitamin A deficiency can cause dry mouth; individuals with dry mouth may have an increased risk of caries.
 - a. First statement is true; second statement is false.
 - b. First statement is false; second statement is true.
 - c. Both statements are true
 - d. Both statements are false
12. Nutritional factors can play a role in the development of periodontal (gum) disease. Periodontal disease has been associated with adverse pregnancy outcomes, heart disease, and diabetes.
 - a. First statement is true, second statement is false
 - b. First statement is false, second statement is true
 - c. Both statements are true

- d. Both statements are false
13. Which of the following is *true* regarding diabetes and oral health?
- a. Patients with uncontrolled diabetes are more susceptible to periodontal (gum) disease.
 - b. Patients with uncontrolled diabetes are more likely to have slow wound healing.
 - c. Diabetes is not related to oral health
 - d. Both a & b
14. Nutrition can exacerbate periodontal disease and over time can increase an individual's chance for heart disease. Which of the following reason explains the relationship between heart disease and oral health?
- a. Bacteria that cause periodontal disease can generate toxins in and throughout the blood stream and contribute to the formation of plaque in arteries.
 - b. Consuming essential nutrients decreases risk of heart disease but increases risk of periodontal disease
 - c. Poor nutrition increases the level of inflammation as seen in periodontal disease and in turn can increase the risk of heart disease.
 - d. Both a & b
 - e. Both a & c
15. Consumption of fruits and vegetables may provide some protection against cancers, including oral cancer. These protective factors are the same for individuals who smoke and consume alcohol and for those who do not.
- a. First statement is true; second statement is false.
 - b. First statement is false; second statement is true.
 - c. Both statements are true
 - d. Both statements are false
16. Oral health professionals should be prepared to do all of the following *except*?
- a. Identify dietary contributors to disease
 - b. Assess patients for nutrition-related diseases pertaining to oral health
 - c. Provide dietary counseling in regards to caries
 - d. Refer patients to the appropriate providers
 - e. Modify diet consumption and behaviors to promote weight loss

Appendix B



Office for the Protection of Human Research Subjects • Box 70565 • Johnson City, Tennessee 37614-1707
Phone: (423) 439-6053

IRB APPROVAL – Initial Exempt

August 31, 2017

Jade Merritt

RE: Interdisciplinary knowledge of ETSU dental hygiene and nutrition students
IRB#: 0817.21e
ORSPA#:

On **August 31, 2017**, an exempt approval was granted in accordance with 45 CFR 46.101(b)(2). It is understood this project will be conducted in full accordance with all applicable sections of the IRB Policies. No continuing review is required. The exempt approval will be reported to the convened board on the next agenda.

- New exempt submission xform, CV of PI, consent (no version date), Script, test questions, Final Prospectus (protocol)

Projects involving Mountain States Health Alliance must also be approved by MSHA following IRB approval prior to initiating the study.

Unanticipated Problems Involving Risks to Subjects or Others must be reported to the IRB (and VA R&D if applicable) within 10 working days.

Proposed changes in approved research cannot be initiated without IRB review and approval. The only exception to this rule is that a change can be made prior to IRB approval when necessary to eliminate apparent immediate hazards to the research subjects [21 CFR 56.108 (a)(4)]. In such a case, the IRB must be promptly informed of the change following its implementation (within 10 working days) on Form 109 (www.etsu.edu/irb). The IRB will review the change to determine that it is consistent with ensuring the subject's continued welfare.

Sincerely,
George Youngberg, M.D., Chair
ETSU/VA Medical IRB

Cc: Dr. Fair



Accredited since December 2005

Appendix C

Dear Participant:

My name is Jade Merritt, and I am an undergraduate Midway Honors Scholar at East Tennessee State University. I am working on my bachelor's degree in dental hygiene. In order to finish my studies, I need to complete a research project. The name of my research study is "Interdisciplinary Knowledge of ETSU Dental Hygiene and Nutrition Students."

The purpose of this study is to determine the level of knowledge of dental hygiene students relating to nutrition and to determine the level of knowledge of nutrition students relating to oral health. To what degree are ETSU senior dental hygiene and nutrition students knowledgeable about the content and relationship of nutrition and oral health? I would like to give a brief online test to both ETSU senior dental hygiene and nutrition students using survey monkey. It should only take about 10-20 minutes to complete; however, participants will have as much time as needed to complete the test and submit it. You will be asked questions about content material pertaining to oral health and nutrition. This test has no risk and should not cause any stress to participants. While there are no direct benefits for participating, participants will receive the benefit of exemplifying their expertise within their discipline and having it collected in the data, which will serve as a tool for the dental hygiene and nutrition program at ETSU to determine if modifications need to be implemented in the curriculum in a way that will assist future students to become more versed in their field.

Your confidentiality will be protected as best we can. Since we are using technology, no guarantees can be made about the interception of data sent over the Internet by any third parties, just like with emails. We will make every effort to make sure that your name is not linked with your answers. Survey monkey has security features that will be used: IP addresses will not be collected and SSL encryption software will be used. Although your rights and privacy will be protected, the East Tennessee State University (ETSU) Institutional Review Board (IRB) and people working on this research within the dental hygiene and nutrition departments can view the study records.

Taking part in this study is voluntary. You may decide not to take part in this study. You can quit at any time. You may skip any questions you do not want to answer or you can exit the online test form if you want to stop completely. There are no penalties if you refuse to participate or if you should stop. The benefits to which you are otherwise entitled to will not be affected. There are no alternative procedures except to choose not to participate in the study.

If you have any research-related questions or problems, you may contact me, Jade Merritt at (865)-310-8616 or merrittjv@etsu.edu. I am working on this project under the supervision of Ms. Tabitha Fair. You may reach her via email at fairtn@etsu.edu. Also, you may call the chairperson of the IRB at ETSU at (423) 439-6054 if you have questions about your rights as a research subject. If you have any questions or concerns about the research and want to talk to someone who is not with the research team or if you cannot reach the research team, you may call an IRB Coordinator at 423/439-6055 or 423/439-6002.

Thank you for your participation!

Sincerely, Jade Merritt

Clicking the AGREE button below indicates

- You have read the above information
- You agree to volunteer
- You are at least 18 years old
- I AGREE
- I DO NOT AGREE

Approved by ETSU/VA Medical IRB / Approval Date: August 31, 2017